DOCUMENT RESUME

ED 107 728 TM 004 587

AUTHOR Bradley, Robert H.; Caldwell, Bettye M.
TITLE Early Home Environment and Changes in Mental Test Performance in Children from 6 to 36 Months.
SPONS AGENCY Carnegie Corp. of New York, N.Y.; Office of Child Development (DHEW), Washington, D.C.
PUB DATE [74]
NOTE 8p.; Paper presented at the Annual Meeting of the American Educational Research Association (Washington, D.C., March 30-April 3, 1975)

EDRS PRICE MF-$0.76 HC-$1.58 PLUS POSTAGE
DESCRIPTORS *Child Development; *Environmental Influences; Family Environment; Infant Behavior; *Infants; Intellectual Development; *Intelligence; Intelligence Tests; *Parent Child Relationship; Parent Influence; Testing; Test Results

ABSTRACT

The present investigation examined the ability of the Inventory of Home Stimulation (STIM) to predict changes in relative mental test performance of children between 6 months old and 36 months of age. The six STIM subscales were used in discriminant analysis to classify infants into three groups (gainers, stable, losers) in terms of their change in relative mental test performance between 6 and 36 months. Significant discrimination was possible using the six subscales. The data also indicate that IQ gains for infants, like IQ gains for older children, appear related to parents' acceleration and encouragement of intellectual development. (Author)

E-5

# Early Home Environment and Changes in Mental Test Performance in Children from 6 to 36 Months

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION
THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

Robert H. Bradley and Bettye M. Caldwell [1]

ED107728

In a recent monograph, McCall, Applebaum and Hogarty (1973) explored the relationship between parent behavior and patterns of IQ change. Their findings showed that parents of children with decreasing IQ patterns made few attempts to accelerate the child's achievement and were either very strict or very lenient in punishing the child. By contrast, parents of children with increasing IQ patterns were "very accelerating, substantially rewarding, clear in their policies, but medium to fairly severe in their penalties" (p. 54). These findings are particularly interesting since IQ profiles appear rather independent of IQ level.

McCall and his colleagues investigated the parental correlates of change in mental test performance for children between 2½ and 17 years of age. To date, no attempt has been made to study similar changes in mental test performance for younger children. Examining effects on change in mental test performance during infancy and very early childhood would appear important for three reasons. First, parents presumably have their greatest impact during the first years of a child's life. Second, children move from the sensorimotor to the preoperational level of thinking prior to age three; and it is during this time that language develops most rapidly. Third, performance on developmental tests during the first years of life is notoriously unstable. Thus, there is need to examine the early environment to see how it may contribute to the changes observed.

The purpose of the present investigation is to examine the relationship between the infant's early home environment and changes in mental test performance from 6 months to 3 years of age.

## Method

### Subjects

Subjects were 59 normal infants and their families. These subjects were selected from a group of 135 children who participated in a longitudinal observation and intervention study at the Center for Early Development and Education (CEDE)

[1] Authors' address: University of Arkansas at Little Rock, Center for Early Development and Education, 814 Sherman, Little Rock, Arkansas 72202. This work is supported in part by Grant No. SF-500, Office of Child Development Department of Health Education and Welfare and a grant from the Carnegie Foundation.



TM 004 587

in Little Rock, Arkansas (Caldwell, Elardo, & Elardo, Note 1). Characteristic of the sample can be found in Table 1.

---

Insert Table 1 about here

---

Instruments

All children were administered the Bayley Scales of Infant Development at six months of age and the Stanford-Binet Intelligence Test at three years of age.

Each family was observed and interviewed using the Inventory of Home Stimulation (Caldwell, Heider, & Kaplan, Note 2) when the child was six months old. The Inventory (called STIM) assesses the quality of stimulation found in the early home environment. It is composed of six subscales: (1) Emotional and Verbal Responsivity of Mother, (2) Avoidance of Restriction and Punishment, (3) Organization of Physical and Temporal Environment, (4) Provision of Appropriate Play Materials, (5) Maternal Involvement with Child, (6) Opportunities for Variety in Daily Stimulation. Previous investigation has shown that scores on the STIM are correlated highly with three year Stanford-Binet performance (Elardo, Bradley, & Caldwell, 1975).

Procedure

For purpose of the present study, 44 of the 135 children who participated in the CEDE longitudinal research project were excluded from the analysis due to the fact that they had participated in the Center's day care or home training intervention efforts. These 44 children received varying kinds and amounts of enrichment experiences in the home and in the Center's day care facility. Therefore, it would be difficult to determine the precise effect that these experiences had on the children's test performance. Fourteen additional infants were excluded because they had not reached their third birthdays. Thus 77 children were considered for inclusion in the study.

The 77 children used had three mental test assessments in common (Bayley Scales at six and twelve months plus Stanford-Binet at 36 months). Because of the limited number of assessments available for the CEDE sample and because of the spacing of those that were available, it was not feasible to analyze mental test profiles in the same manner as did McCall, et al (1973). Instead of classifying infants as increasers and decreasers on the basis of their pattern of test scores,

classification was done on the basis of mental test scores gathered at 6 and 36 months of age only. Using 6 month Bayley Mental Development Index (MDI) scores and 36 month Binet scores as indicies of mental development at those two points, children were designated as having changed their relative status of mental development in the following manner. First, all subjects whose six month MDI scores were above 120 or below 80 were excluded from the analysis. These subjects were eliminated since changes in extreme scores would quite likely be due to regression to the mean (Lord, 1963). In excluding those children who had an extreme score at six months, it was hoped that an examination could be made of the relationship between early stimulation and change in mental test performance independent of initial level of performance. This step eliminated all but 59 children. Second, mental test scores of the remaining 59 children were plotted in two dimensional space: one axis designating the 6-month MDI score, the second axis designating the 36 month Binet score. The resulting plot of 59 points was examined to see if, in this geometric representation of scores, increasers and decreasers might be clearly identifiable. The examination indicated that by drawing lines parallel to the "no change" line and approximately one standard error of the difference score (20 points) distant from it, three rather separate groups of subjects were evident. On this basis, eight children were labeled increasers, 38 non-changers and 13 decreasers.

Defining increasers and decreasers in the manner described would appear to be a reasonably conservative way of doing so given that the reliability of the difference score was computed at .76. By the same token, some infants who actually increased or decreased in developmental status were probably not labeled as an increaser or decreaser since all subjects whose MDI score were at the extremes of the distribution were eliminated. Also a 20-point change in mental test performance was required in order to label someone as an increaser or decreaser. The present writers decided that a somewhat conservative definition was preferable given the difficulty of obtaining a valid measure of change (see Cronbach and Furby, 1970 for a discussion of this issue). It is important to remember, nonetheless, that any interpretation of the findings of this study should be made bearing in mind the manner in which increasers and decreasers were defined.

## Results

The six STIM subscales were used in a multiple discriminant analysis in an effort to differentiate among the group that improved in mental test performance, the group that remained stable, and the group that declined. A Mahalancois $D^2$ statistic was calculated and used as $\chi^2$ to test whether the mean of these three groups were different for the six STIM scores. The $\chi^2$ was significant ($p. < .01$). Significant univariate effects were observed for Maternal Involvement with Child ($p. < .01$) and Provision of Appropriate Play Materials ($p. < .10$).

## Discussion

The present data extend some of the findings of McCall, et al. (1973) to younger children. Specifically, mental test score increases for infants, like mental test score increases for older children, appear to be related to parents' acceleration and encouragement of intellectual development. Mothers whose infants improve in mental test performance not only encourage and challenge the child to develop new skills, but they also provide the child with the kinds of play meterials needed for development. The significant relationship between child developmental gains and parent's provision of appropriate play materials observed in the present investigation is also consonant with Piaget's contention that children will move more readily from the sensorimotor to the preoperational level of thinking if provided the opportunity to interact in appropriate ways with the environment.

McCall and his colleagues also found that gains in mental test performance in older children were related to the parents' use of a moderate, rationally structured approach to discipline. The home environment measure used in the present study did not afford a means of determining whether the same holds true for children below the age of three. However, in the present investigation, increasers and decreasers did not differ in terms of the parents' use of punishment, thus suggesting that the parents' method of discipline may not play as crucial a role in cognitive developmental changes for very young children. Further examination of the relationship between the two variables is needed.

## Reference Notes

1. Caldwell, B. M.; Elardo, P. and Elardo, R. The longitudinal observation and intervention study: A preliminary report. Paper presented at the meeting of the Southeastern Conference on Research in Child Development, Williamsburg, Virginia, 1972. (Available from CEDE, 814 Sherman, Little Rock, Arkansas 72202.)

2. Caldwell, B. M.; Heider, J.; and Kaplan, B. The inventory of home stimulation. Paper presented at the meeting of the American Psychological Association, 1966. (Available from CEDE, 814 Sherman, Little Rock, Arkansas.)

## References

Cornbach, J.; and Furby, L. How should we measure "change" -- or should we? Psychological Bulletin, 1970, 74, 68-80.

Elardo, R.; Bradley, R. H.; and Caldwell, B. M. The relation of infants' home environment to mental test performance from 6 to 36 months: A longitudinal analysis. Child Development, 1975 (in press).

Lord, M. Elementary models for measuring change. In Chester W. Harris (ed.) Problems in Measuring Change. Madison, Wisconsin: The University of Wisconsin Press, 1963.

McCall, R. B.: Appelbaum, M. I.; and Hogarty, P. S. Developmental changes in mental performance. Monographs of the Society for Research in Child Development, 1973, 38 (3).

TABLE 1

Characteristics of the Sample[1]

Family Data (N=59)

Welfare - 17, Non-Welfare - 42
Father absent - 17, Father present - 42
Maternal Education (Avg. No. of yrs.) - 12.2
Paternal Education (Avg. No. of yrs.) - 13.0
Paternal Occupation (wide range of employment, but on the average about skilled labor to sales.)

Child Data

| | | |
|---|---|---|
| Black males: | N = 21 | |
| White males: | N = 15 | |
| Black Females: | N = 15 | |
| White Females: | N = 8 | |
| Birth Order: | First born or Only child = | 33 |
| | Second or Third born = | 18 |
| | Fourth or Later born = | 8 |

1. Complete data were not available for all families. Above estimates are based on available data.